

ART 34 AMDT

## CLAIMS

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(42)

1. An isolated, modified, Family 11 xylanase characterized in exhibiting at least 40% of optimal activity from about pH 3.5 to about pH 6.0, and from about 40 to about 50°C, said xylanase being thermostable.
2. The isolated xylanase of claim 1 wherein said xylanase is characterized in exhibiting at least 40% of optimal activity from about 40 to about 60°C.
3. The isolated xylanase of claim 2 wherein said thermostability is characterized by said xylanase exhibiting at least 30% of optimal activity after a pre-incubation step for 30 minutes at 70°C in the presence of 40% glycerol.
4. The isolated xylanase of claim 2 wherein said thermostability is characterized by said xylanase exhibiting at least 30% of optimal activity after a pre-incubation step for 30 minutes at 80°C in the presence of 40% glycerol.
5. The isolated xylanase of claim 2 wherein said thermostability is characterized by said xylanase exhibiting at least 30% of optimal activity after a pre-incubation step for 30 minutes at 90°C in the presence of 40% glycerol.
6. The isolated xylanase of claim 2 wherein said thermostability is characterized by said xylanase exhibiting at least 30% of optimal activity after a pre-incubation step for 60 minutes at 62.5°C.
7. The isolated xylanase of claim 5 wherein said thermostability is determined in the absence of stabilizer.
8. The isolated xylanase of claim 6 wherein said thermostability is determined in the absence of stabilizer.
9. The isolated xylanase of claim 2, wherein said xylanase is a modified xylanase.

10. The isolated xylanase of claim 9, wherein said xylanase is a Family 11 xylanase.
11. The isolated xylanase of claim 10, wherein said Family 11 xylanase is a *Trichoderma* xylanase.
12. A modified xylanase comprising a basic amino acid at position 162 (TrX numbering) or its equivalent, exhibiting at least 40% of optimal activity from about pH 3.5 to about pH 6.0, and from about 40 to about 60°C, said modified xylanase being thermostable.
13. The modified xylanase of claim 12, wherein said basic amino acid is selected from the group consisting of lysine, arginine and histidine.
14. The modified xylanase of claim 13, wherein said basic amino acid is histidine.
15. The modified xylanase of claim 9 comprising at least one disulfide bridge.
16. The modified xylanase of claim 9 comprising two disulfide bridges.
17. The modified xylanase of claim 9 comprising a basic amino acid at position 162 (TrX numbering) or its equivalent position, and at least one disulfide bridge.
18. The modified xylanase of claim 9 selected from the group consisting of TrX-162H-DS1, TrX-162H-DS2, TrX-162H-DS4, and TrX-DS8.
19. The modified xylanase of claim 18, wherein said xylanase is TrX-162H-DS1.
20. The modified xylanase of claim 18, wherein said xylanase is TrX-162H-DS2.
21. The modified xylanase of claim 18, wherein said xylanase is TrX-162H-DS4.
22. The modified xylanase of claim 18, wherein said xylanase is TrX-DS8.

23. A method of obtaining a Family 11 xylanase comprising:
- i) selecting an organism that expresses xylanase activity, and obtaining said xylanase from said organism;
  - ii) determining whether said xylanase exhibits at least 40% of optimal activity from about pH 3.5 to about pH 6.0, and from about 40 to about 60°C; and
  - iii) determining whether said xylanase is thermostable, and whether said xylanase is a Family 11 xylanase; and
  - iv) retaining said xylanase that express these properties.
24. The method of claim 23, wherein step i) includes partially purifying said xylanase.
25. A method of preparing animal feed comprising applying the isolated xylanase of claim 1 onto said animal feed to produce a xylanase-animal feed combination, and heat sterilizing said xylanase-animal feed combination.
26. The method of claim 25, wherein said animal feed is a poultry or swine feed.
27. A method of preparing animal feed comprising, applying the xylanase obtained from step iv) of claim 23 onto said animal feed to produce a xylanase-animal feed combination, and heat sterilizing said xylanase-animal feed combination.
28. The method of claim 27, wherein said animal feed is a poultry or swine feed.
29. An isolated recombinant xylanase characterized in exhibiting at least 40% of optimal activity from about pH 3.5 to about pH 6.0, and from about 40 to about 50°C, said recombinant xylanase being thermostable.
30. The modified xylanase of claim 12 comprising at least one disulfide bridge.
31. The modified xylanase of claim 12 comprising two disulfide bridges.

32. The isolated, modified, xylanase of claim 1, said xylanase obtained from an organisms selected from the group consisting of *Aspergillus niger*, *Aspergillus kawachii*, *Aspergillus tubigenis*, *Bacillus circulans*, *Bacillus pumilus*, *Bacillus subtilis*, *Cellulomonas fimi*, *Chainia spp.*, *Clostridium acetobutylicum*, *Clostridium stercorarium*, *Fibrobacter succinognees*, *Neocallimasterix patriciarum*, , *Nocardiopsis dassonvillei*, *Ruminococcus flavefaciens*, *Schizophyllum commune*, *Streptomyces lividans*, *Streptomyces lividans*, *Streptomyces sp. No. 36a*, *Streptomyces thermoviolaceus*, *Thermomonospora fusca*, , *Trichoderma harzianum*, *Trichoderma reesei*, *Trichoderma reesei*, and *Trichoderma viride*.